

WHAT IS CLAIMED IS:

1. A wafer edge exposing apparatus, comprising:

a light source device for generating source light;

5 an optical fiber cord for guiding the source light generated from
the light source device into a light focusing device;

a lens positioned in the light focusing device to receive the
source light from the optical fiber cord, the light focusing device to
focus the source light to the edge of a wafer; and

10 a wavelength converter for converting a wavelength of the
source light to a wavelength corresponding to the highest
absorptivity of a photoacid generator of resist coated on the wafer.

2. The wafer edge exposing apparatus of claim 1, wherein

15 the light source device includes a lamp, a parabolic or elliptical
mirror, a plate, a shutter, and a filter.

3. The wafer edge exposing apparatus of claim 1, wherein

the wavelength converter is made of an optically non-linear material.

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4. The wafer edge exposing apparatus of claim 3,

wherein the optically non-linear material is one selected from the group consisting of beta barium borate (β -BaB₂O₄), lithium triborate (LiB₃O₅), cesium lithium borate (CsLiB₆O₁₀), potassium titanyl phosphate (KTiOPO₄), potassium titanyl arsenate (KTiOAsO₄),
5 potassium dihydrogen phosphate (KH₂PO₄), deuterated ammonium dihydrogen phosphate (KD₂PO₄), ammonium dihydrogen phosphate (NH₄H₂PO₄), deuterated ammonium dihydrogen phosphate (ND₄H₂PO₄), rubidium dihydrogen phosphate (RbH₂PO₄), cesium
10 dihydrogen arsenate (CsH₂AsO₄), deuterated cesium dihydrogen arsenate (CsH₂AsO₄), lithium niobate (LiNbO₃), lithium tantalate (LiTaO₃), lithium iodate (LiIO₃), potassium niobate (KNbO₃), barium nitrate (Ba(NO₃)₂), solid-state raman shifters (KGd(WO₄)₂),
potassium pentaborate, 3-methyl-4-nitropyridine-1 oxide, L-arginine
15 phosphate, and combinations thereof.

5. The wafer edge exposing apparatus of claim 1, wherein the resist is ArF resist.

20 6. The wafer edge exposing apparatus of claim 2, wherein the lamp is a mercury arc lamp.

7. The wafer edge exposing apparatus of claim 1, wherein the source light is i-line.

8. The wafer edge exposing apparatus of claim 1, wherein
5 the source light is one of lights having a wavelength within the ultraviolet range.

9. The wafer edge exposing apparatus of claim 3, wherein the wavelength converter is made of either one of potassium titanyl
10 phosphate (KTiOPO_4) and potassium dihydrogen phosphate (KH_2PO_4).

10. The wafer edge exposing apparatus of claim 2, wherein the wavelength converter is positioned in front of the lamp.

11. The wafer edge exposing apparatus of claim 2, wherein
15 the wavelength converter is positioned between the optical fiber cord and the filter.

12. The wafer edge exposing apparatus of claim 1, wherein
20 the wavelengths converter is positioned between the lens and the optical fiber cord.

13. The wafer edge exposing apparatus of claim 1, wherein the wavelength converter is installed at the end of the light-focusing device.

5 14. The wafer edge exposing apparatus of claim 1, wherein the wavelength converter is attachable/removable.

15 15. The wafer edge exposing apparatus of claim 1, wherein an anti-reflective coating film (ARC) is coated on surface of the wavelength converter.

16 16. The wafer edge exposing apparatus of claim 15, wherein the anti-reflective coating film (ARC) is made of one selected from the group consisting of zirconia (ZrO_2), magnesia (MgO), silica (SiO_2), titania (TiO_2), and combinations thereof.

17. A wafer edge exposing apparatus, comprising:
a light source device for generating a source light;
an optical fiber cord for guiding the source light;
20 a light focusing device for receiving the source light from the optical fiber cord and focusing the source light into a wafer; and

a wavelength converter for converting the wavelength of the source light to a wavelength corresponding to the highest absorptivity of a photoacid generator of resist coated on the wafer.

5 18. The wafer edge exposing apparatus of claim 17,
wherein the wavelength converter is positioned in the light source device.

10 19. The wafer edge exposing apparatus of claim 18,
wherein the wavelength converter is positioned in the light-focusing device.

15 20. The wafer edge exposing apparatus of claim 17, wherein the light source device includes a lamp, a parabolic or elliptical mirror, a plate, a shutter, and a filter.

21. The wafer edge exposing apparatus of claim 17, wherein the wavelength converter is made of an optically non-linear material.

20 22. The wafer edge exposing apparatus of claim 21,
wherein the optically non-linear material is one selected from the group consisting of beta barium borate (β -BaB₂O₄), lithium triborate (LiB₃O₅), cesium lithium borate (CsLiB₆O₁₀), potassium titanyl

phosphate (KTiOPO_4), potassium titanyl arsenate (KTiOAsO_4),
potassium dihydrogen phosphate (KH_2PO_4), deuterated ammonium
dihydrogen phosphate (KD_2PO_4), ammonium dihydrogen phosphate
($\text{NH}_4\text{H}_2\text{PO}_4$), deuterated ammonium dihydrogen phosphate
5 ($\text{ND}_4\text{H}_2\text{PO}_4$), rubidium dihydrogen phosphate (RbH_2PO_4), cesium
dihydrogen arsenate (CsH_2AsO_4), deuterated cesium dihydrogen
arsenate (CsH_2AsO_4), lithium niobate (LiNbO_3), lithium tantalate
(LiTaO_3), lithium iodate (LiIO_3), potassium niobate (KNbO_3), barium
nitrate ($\text{Ba}(\text{NO}_3)_2$), solid-state raman shifters ($\text{KGd}(\text{WO}_4)_2$),
10 potassium pentaborate, 3-methyl-4-nitropyridine-1 oxide, L-arginine
phosphate, and combinations thereof.

23. The wafer edge exposing apparatus of claim 17, wherein
the resist coated on the wafer is ArF resist.

24. The wafer edge exposing apparatus of claim 20, wherein
the lamp is a mercury arc lamp.

25. The wafer edge exposing apparatus of claim 17, wherein
20 the source light is i-line.

26. The wafer edge exposing apparatus of claim 17, wherein the source light is one of lights having a wavelength within the ultraviolet range.

5 27. The wafer edge exposing apparatus of claim 17, wherein the wavelength converter is made of either one of potassium titanyl phosphate (KTiOPO_4) and potassium dihydrogen phosphate (KH_2PO_4).

10 28. The wafer edge exposing apparatus of claim 17, wherein the wavelength converter is attachable/removable.

29. The wafer edge exposing apparatus of claim 17, wherein an anti-reflective coating film (ARC) is coated on surface of the wavelength converter.

15 30. The wafer edge exposing apparatus of claim 29, wherein the anti-reflective coating film (ARC) is made of one selected from the group consisting of zirconia (ZrO_2), magnesia (MgO), silica (SiO_2), titania (TiO_2), and combinations thereof.

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